

The PA Catheter Waveforms Troubleshooting System: A Demonstration of Simple Graphical Knowledge Access for Clinical Care

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The Pulmonary Artery Catheter Waveforms Troubleshooting System is a resource for on-site decision support and education now in use on several care units at Massachusetts General Hospital. The system provides access to clinically applicable information about specific pulmonary artery catheter waveform abnormalities, including characteristics, causes, interventions and measurement techniques. The method of access to information in the system is through waveform selection screens that depict prototypical waveform problems. Supplementary material is presented in structured tutorials and a glossary that is integrated with the troubleshooting screens using hypertext links. The presentation will highlight a number of lessons from our experiences with the development of this system and its introduction and use on care units. The principal points are:

a. The importance of knowledge resources that can be used by caregivers at the time when they need the knowledge. We developed this system to test our hypothesis that providing clinically applicable information resources on care units can be a powerful method of clinical education, particularly in areas of specialty expertise. The value of such a system to the experienced specialist may be less than that for the relative novice. We have found that the utilization of the system has increased when it has been made available in patient care areas where multiple staff are engaged in cross-training.

b. The importance of a user interface that requires virtually no training. Clinicians do not have time to spare for learning about complex user interface features. We set as a design goal that the user interface for this knowledge resource should be simple enough that it would be immediately clear to the first-time user how to proceed. We achieved this goal by:

- modelling the user interface design on a simplified model of problem-solving in the domain of PA catheter waveforms troubleshooting

- intensive use of graphical methods of presentation
- strict hierarchical organization of content
- repeated early evaluations of paper mock-ups and working prototypes with clinicians from the intended user populations

c. The primacy of credible content. For a knowledge resource to be seen to be worth using, the knowledge it conveys must be authoritative, current and consistent with local standards of practice. The resource must be comprehensive within a well-defined domain, so that caregivers can easily understand its scope. To meet these requirements, our project was pursued as a collaboration with clinical content experts who wrote, edited, and revised text, specified illustrations and evaluated early system designs. Obtaining expert collaboration entailed accommodating an extended consensus-building process. The large investment in content development and validation has yielded a system that has been able to move directly from research to adoption for use in critical care orientation programs run by the MGH Department of Nursing.

d. The importance of clinical opinion leaders on the units. Enthusiastic support from the clinical opinion leaders on the unit has proven to be a key determinant in the successful installation of this system. The leaders usually include the nurse manager, the medical director and especially those involved in consultation and staff training. Fully engaging these busy individuals requires providing clear models for system use. In the presentation we will walk through the system using written case scenarios we make available in order to provide additional structure in introducing the system in teaching.

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